

INL researchers win two Idaho Innovation Awards

Photo: Stoots with award

Two technologies that will contribute to energy and emergency management won honors on Oct. 2 at the 2nd Annual Stoel Rives Idaho Innovation Awards in Boise and two more were finalists. In the competition, six companies grabbed honors in as many categories from among the top 16 finalists.

INL's Syntrolysis technology won honors in the energy category for an invention that leverages co-electrolysis processes to produce both synthetic gas and hydrogen simultaneously. A team of six inventors worked together to advance this technology, which also was nominated for an R&D 100 award during 2007. The team included Carl Stoots, James O'Brien, Steve Herring, Paul Lessing, Grant Hawkes and Joseph Hartvigsen.

Carl Stoots, senior research engineer, said, "Our team was very pleased to receive this award. We have been working hard on co-electrolysis research for several years to help America and the world meet energy demands with environmentally friendly processes. Syntrolysis will help reach that goal."

In the enterprise business-to-business software category, INL's Critical Infrastructure Modeling Suite (CIMSuite), took the top award for 3D modeling software that can create virtual infrastructure system models to help plan and monitor how events could affect the support systems for cities, companies or large complexes. A team of three inventors worked to develop CIMSuite and included Don Dudenhoeffer, Steve Woolsey and May Permann. CIMSuite also was nominated for the R&D 100 award in 2007.

Carl Stoots accepted the award for his team members. We have been working hard on co-electrolysis research for several years to help America and the world meet energy demands with environmentally friendly processes, said Stoots.

Dudenhoeffer, team leader for the CIMSuite research, said, "Selection by the Idaho Innovation Award judges validates much of our team's investment. We have an exceptional tool that can save lives, property, critical infrastructure and money by predicting and acting in emergency situations. We are working with our licensee, Priority 5, to make this technology available to all who need it."

The award program was presented by the Idaho Department of Commerce Office of Science & Technology. The major sponsors included Stoel Rives, a major business law firm located in seven Western states of the U.S.; Hewlett-Packard, located in Boise; and the Idaho Business Review.

Two other INL inventions were finalists in the 2007 competition. Those included HTIR-TC, a thermocouple used for monitoring high-temperature industrial processing, and a Transmission Line Security Monitor, which provides real-time indications of conditions and disturbances to electric power transmission systems.

The other four categories were Agriculture-Environmental-Bioscience won by E.B. Meyer, Inc. for a pest removal invention (Rodenator); Computer Hardware-Electrical Devices won by Comtech AHA, Inc., a Moscow-based company which invented a circuit that accelerates data transfer by compacting the data before transmission (World); Semiconductor Manufacturing, won by AMI Semiconductor from Pocatello for its Ezairo 5910T processing chip for the hearing-aid industry. The chip uses less power than other chips but delivers high-precision sound; and Other won by 2Moto, Inc. for inventing the Radix and Rogue Snowbike.

"This year's finalists and winners are a great representation of the variety of innovation taking place throughout the state among companies of all sizes from small start-ups to well-established, large corporations," said Stoel Rives Boise Office Managing Partner Kris Ormseth. "We hope that the recognition that comes with being an Idaho Innovation Awards finalist and winner will contribute to the success of these companies."

A panel of 40 leaders from industry, education and government judged the competition in 2007. In 2006, two INL technologies also won top honors, including Medical Actinium Therapeutic Treatment (MATT) and Robot Intelligence Kernel. More information is available at www.stoel.com

Critical Infrastructure Modeling (CIMSuite) software

Summary: Modern life is built upon an array of complex interactions among multiple and diverse physical and social infrastructures. We don't always appreciate interdependencies of seemingly separate systems such as utilities, transportation and health care until one is interrupted, resulting in cascading effects on the others. When a critical system is lost, the inevitable consequences are not always easy to predict.

Photo: CIMSuite team

CIMSuite Development Team at INL: (left to right) Donald D. Dudenhoeffer, May R. Permann and Steve R. Woolsey.

Photo: CIMSuite package

CIMSuite is currently under license and being actively marketed by Priority 5 Holdings, LLC, (www.priority5.com), a company that specializes in developing Critical Infrastructure Management solutions.

The interactions of multiple systems and complex, multilevel system failures create significant consequences, and frequently, disastrous results. CIMS offers a portable, user-friendly software system to promote understanding of these complex interactions and manage events like this on the fly.

Believing that the key to complexity is simple elegance, researchers at INL have developed this powerful but easy-to-use tool to enable decision makers to prepare for, and respond to, events with previously unpredictable results. Unlike any other software available or in development, CIMSuite software is ready for deployment both in the office and in the field.

CIMSuite software delivers an agile (less than 10 megabytes) off-the-shelf modeling solution with advanced simulation capabilities. The user interface is intuitive and visually based. Anyone familiar with tools like GIS or Google Earth can unleash the power of interaction in a familiar virtual 3-D world that becomes a canvas for event simulation.

Based on sophisticated artificial intelligence code using intelligent agents, CIMSuite software offers powerful, easy-to-use tools for both modeling and simulating complex interactions of infrastructure systems and predicting emergent behaviors through time. CIMSuite software gives users the potential to integrate multiple systems and visualize the results of cascading events including factors such as human social dynamics. The software is not only capable of building a scaleable model of these interacting physical and social systems, but the data structure created by CIMSuite software lends itself to both 3-D visualization and further algorithmic treatment, including time-step simulations, real-time data integration and analysis using methods such as genetic algorithms and neural networks.

Fact Sheet: [CIMSuite: Critical Infrastructure Modeling](#) — 412kB PDF

Video: [CIMSuite: Delivering 3-D modeling and simulation of critical infrastructure systems](#) – 4.4MB WMV

Research Team: Don Dudenhoeffer, May Permann and Steve Woolsey

Tech Transfer Contact: Charity Follett, (208) 526-9353,

Syngas Generation from Co-Electrolysis (Syntrolysis)

Summary: Two of the top energy priorities in the world today are finding environmentally friendly alternatives to fossil fuels and eliminating or reducing anthropogenic carbon dioxide emissions.

Imagine a technology that does both—consuming carbon dioxide while creating synthetic alternative fuels that are carbon-neutral. This breakthrough technology is INL's Syngas Generation from Co-electrolysis (Syntrolysis). The invention

consists of a patent pending high-temperature electrolysis process that uses a solid-oxide electrolysis cell designed to take advantage of electricity from nuclear or renewable energy sources and industrial process heat to simultaneously convert water and carbon dioxide into a product known as synthesis gas (aka syngas) consisting of hydrogen and carbon monoxide. Syngas is an intermediate feedstock for producing synthetically derived hydrocarbon products and fuels.

Syngas created through Syntrolysis can be processed using a well-understood synthetic fuel production regimen, the Fischer-Tropsch, to create liquid hydrocarbon fuels without fossil energy of any kind. Unlike current carbon management technologies that have thermodynamic and economic costs, Syntrolysis converts carbon pollutants (generating carbon credits) into value-added products with both thermodynamic and economic benefits rather than costs.

In addition to producing syngas, this invention offers the capability of efficiently producing pure hydrogen as well by using steam sans carbon dioxide as the sole input. Hydrogen can be used in the near term to upgrade low-quality petroleum resources such as Canadian oil sands, enhance biofuel production and facilitate the long-term transition to a hydrogen economy.

Fact Sheet: [Syntrolysis: Synthetic fuels from carbon dioxide, electricity and steam](#) — 740kB PDF

Video: [Syntrolysis: Simultaneously electrolyzing water and carbon dioxide into syngas](#) – 4.6MB WMV

Research team: Carl M. Stoots, James O'Brien, Stephen Herring, Paul Lessing, Grant Hawkes, plus Joseph Hartvigsen, a senior engineer at Ceramtec, Inc, in Salt Lake City.

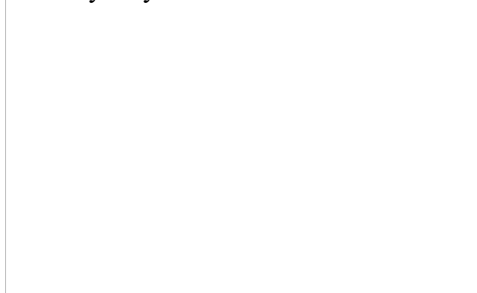
Tech Transfer Contact: David Anderson, (208) 526-0837,

General Contact:

Keith Arterburn, (208) 526-4845,

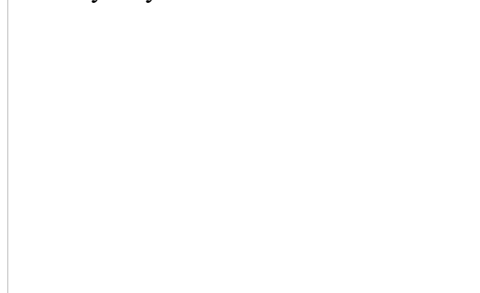
[Feature Archive](#)

Photo: Syntrolysis team



INL Syntrolysis Development Team in the laboratory: (left to right) James E. O'Brien, Carl M. Stoots, Grant L. Hawkes and J. Stephen Herring (INL). Joe J. Hartvigsen (Ceramtec) is not in the photos.

Photo: Syntrolysis



Carl Stoots demonstrates how the final product of Syntrolysis, synthesis gas (aka syngas), can be burned directly. The gas can also be converted into synthetic hydrocarbon fuels.